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Greenhouse and Nursery Sector Blossoming

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PERSPECTIVES

El Niño, the phenomenon that can produce unusual winter weather across the United States, has caused less variation than might have been expected, reports meteorologist Norton Strommen of USDA's World Agricultural Outlook Board.

An El Niño causes a disruption of average weather patterns in different areas—from Africa and Australia across the Pacific Ocean to North and South America—of differing magnitude.

"Statistically, we would expect an El Niño to increase winter rainfall in the southern United States and produce unusually warm weather in the Pacific Northwest—and these effects did occur," Strommen says. "On the other hand, we would also expect to see warmer-than-normal winter temperatures in the Northeast and heavier-than-normal rainfall in the States along parts of the eastern Gulf—but these things did not happen."

El Niños vary in frequency and duration as well as in intensity. For example, they can be separated by as few as 3 or as many as 7 years. There have been 24 such events since 1887.

Each usually lasts for about 1 year, but some have continued for 2 years. Although the present one has weakened, Strommen says, it still has some strength left, so its effects could linger for another 2 or 3 months.

An El Niño is caused by major changes in the pressure patterns over the central and equatorial Pacific, Strommen explains. "The semi-permanent high pressure field weakens, resulting in shifts in wind patterns and the more typical winter weather patterns," he says. "Researchers are still searching for the exact cause of the event."

However, researchers believe it is possible to predict an El Niño 4 to 6 months before it begins. "They predicted the onset of the current El Niño last spring," Strommen notes.

And the effects of the present El Niño? The mild winter and record-high temperatures it produced in the Great Plains this past winter actually benefited the hard red winter wheat crop. "The record warmth aided Kansas winter wheat," Strommen explains, "because it gave the crop—which had gotten off to a poor start—the warmth and moisture it needed to grow for most of the winter."

In the eastern Corn Belt, planting was delayed this spring because of wet weather. Subsoil moisture, on the other hand, still needs to be recharged. "This year's corn crop will depend on summer rains," Strommen says. "But overall, for major crop areas, subsoil moisture is at its highest level since 1987, and should be adequate to maintain most crops during dry spells."

— Priscilla B. Glynn

FARMLINE

AGRICULTURE...NATURAL RESOURCES...RURAL DEVELOPMENT
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FEATURES

DEPARTMENTS

Greenhouse and Nursery Sector Blossoming

The rose — still the most popular flower in the United States

Greenhouse and nursery crops accounted for 10 percent of farm crop cash receipts in 1990

Americans spend almost as much for flowers and plants as they do for fresh produce, according to economist Doyle Johnson of USDA's Economic Research Service.

In 1990, U.S. retail expenditures for all greenhouse and nursery products totaled about $37.6 billion, or $150 per capita. (The United Fresh Fruit and Vegetable Association estimates that consumer expenditures for fresh produce in 1990 were $49 billion). Johnson expects expenditures to keep rising to a total of $44 billion in 1992, or $172 per capita.

Greenhouse and nursery crops accounted for 10 percent of farm crop cash receipts—ahead of such major crops as wheat and cotton.

The industry is vast and sprawling. Its products include such cut flowers as hybrid tea roses and orchids imported from Thailand, cut foliage such as Mexican chamaedorea and leatherleaf ferns imported from Costa Rica, potted plants (flowering and foliage types), bedding and garden plants (vegetable and flowering varieties), deciduous trees and shrubs (which lose their leaves each year), evergreen trees and shrubs, turfgrass, groundcovers, and tulip bulbs from the Netherlands.

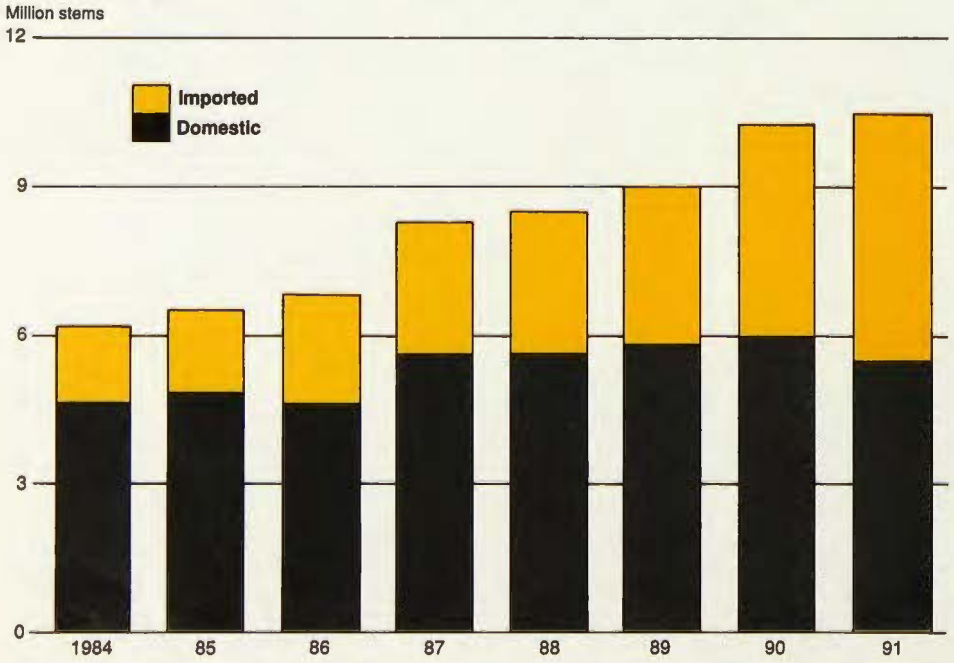
These items are available from a burgeoning number of florists, sidewalk vendors, supermarkets, garden centers, nursery and landscape firms, and "interiorscape" firms (which specialize in providing plants for hotels and business offices), as well as through catalog sales. Retail floral outlets alone now number about 70,000—up 18,000 from just 5 years ago, Johnson says.

And cash receipts to producers are rising right along with consumer expenditures for flowers and plants. For 1991, cash receipts to greenhouse and nursery producers were about 7 percent higher than in 1990, totaling $8.7 billion—making this the fastest growing of all major farm sectors. Cash receipts are expected to rise 9 percent in 1992, and total $9.5 billion.

Greenhouse and nursery crops are classified as "nonedible horticulture," or flowers and plants primarily grown for ornamental or environmental purposes. "Floriculture" refers to plants grown for ornamental purposes, and they generally live through one season. These include cut flowers, cultivated greens, potted flowering plants, potted foliage plants, and bedding and garden plants. Although usually grown in greenhouses, some are grown outdoors. In 1991, such products likely made up about 42 percent of total retail expenditures, or $16.9 billion.

By contrast, plants grown for environmental as well as ornamental purposes generally last for many seasons. They include such outdoor landscaping plants as trees, shrubs, and groundcovers (such as ivy, creeping phlox, periwinkle, and portulaca), but also bulbs, sod, or any other plants sold as nursery stock for ornamental, environmental, or food production. In 1991, these

Imports Are Rapidly Increasing Their Share of the U.S. Rose Market



made up about 58 percent of total retail expenditures, or $23.3 billion.

Johnson attributes the unprecedented growth in the demand and supply for flowers and plants to these factors:

- Consumer awareness of the environment,
- Ready availability of flowers and plants in a profusion of retail markets, such as supermarkets, garden centers, street vendors, and other local outlets,
- Industry diversification into annual and perennial crops (providing a great variety of choices),
- The wide array of horticultural ventures in crops and markets compared with other types of farming, and
- The ease of starting up a nursery or related business.

"Many producers have started on small acreages," Johnson says. "Nonedible horticulture can provide a good supplemental income or a viable alternative to traditional farming, where real prices and incomes have fallen."

Demand for Plants To Rise

Johnson expects that demand for bedding and garden plants, the largest subsector in floriculture, will remain strong in 1992-93. "Even in a slow economy, demand has been strong for flowering bedding and garden plants," Johnson says. By contrast, demand for vegetable bedding plants has been only moderate. Sales of flowering annuals and perennials are expected to jump this year and next. Bedding plants in popular demand include impatiens, petunias, geraniums, marigolds, pansies, vinca minor, begonias, lobelia, dusty miller, salvia, ageratum, and alyssum.

Landscaping contractors, homeowners, institutions, and others needing to maintain the appearance of an outdoor environment will buy more bedding and garden plants, Johnson says. Aside from parts of the Northeast, where sluggish construction and real estate markets have depressed demand, business should be brisk this spring for growers, wholesalers, and retail outlets.

In 1990, retail sales of bedding and garden plants totaled about $4.3 billion, or $17 per capita. Sales in 1991 are expected to have risen to $4.7 billion, and those for 1992 will likely top $5.4 billion, or slightly more than $21 per capita.

Trends in bedding and garden plants include fewer plants per flat or pack and larger plants. Johnson attributes this

Flowers and Plants Are Big Business

Flowers and plants are big in wholesaling, landscaping, interiorscaping, and retailing.

Here's just a snapshot view:

Nonedible Horticultural Products

- In 1990, they ranked seventh among all farm commodities in cash receipts, and in the top five in 21 States. All crop commodities (grains, oilseeds, other field crops, fruits, vegetables, and so on) totaled $80 billion for 1990, of which greenhouse and nursery made up $8 billion, or 10 percent.
- Over the past 10 years, they have brought in the highest gross and net returns per farm of any agricultural enterprise—but also require the most inputs.
- They are among the most promising agricultural enterprises in terms of grower cash receipts and growth rate.
- In 1990, they were the number-one agricultural enterprise by cash receipts in Alaska, Connecticut, Massachusetts, New Jersey, and Rhode Island, and ranked second in California, Florida, New Hampshire, and Oregon.

Other Facts About This Sector

The greenhouse and nursery sector deserves attention from producers, researchers, and others for many more reasons:

- When value-added services and employment are added, the greenhouse and nursery industry outranks most traditional commodities in total dollar expenditures by consumers. ("Value-added" services include any activities that enhance a product, such as delivery of cut flowers to a wedding, maintenance of a golf course, or landscaping of new homes.)
- Cash receipts for greenhouse and nursery crops have the fastest annual growth rate of all major segments of U.S. agriculture, with no downturns in the past 30 years. This was accomplished without Federal subsidies or production or marketing incentives, such as price supports and export enhancements.
- About 36,000 U.S. farms grow nursery and greenhouse crops—using 450,000 acres in the open and more than 50,000 acres under glass or other protection. This figure excludes any farms growing food crops under cover, flower and vegetable seeds, and cut Christmas trees. Including these would add about 20,000 more farms and nearly 1 million acres.

"Interiorscaping" is becoming popular in homes, offices, and hotels

change to consumers who want fewer, larger plants and more variety. Also, fewer people are living in houses. They live in apartments and condos, and prefer plants in color bowls (such as potted plants, house plants, and centerpieces), boxes, and tubs. He also notes that hanging baskets are making strong gains.

"Sales of potted plants, especially flowering varieties, are expected to rise sharply in 1992," says Johnson. Depending on the economy, he adds, this rise may not begin in earnest until this fall or next spring.

In 1990, consumers spent about $3.3 billion for potted flowering plants and about $2.4 billion for potted foliage plants. In 1991, consumer expenditures for these potted house and patio plants (including hanging baskets) rose moderately.

Sales are continuing to expand for poinsettias, chrysanthemums, azaleas, lilies, geraniums, and begonias. Other flowering plants, such as African violets, anthuriums, cineraria, cyclamen, impatiens, and kalanchoes, are also doing very well.

"Consumers are seeking larger and higher quality plants, multicolor varieties, and plants with rich, vivid colors," Johnson says. For poinsettias, the biggest seller among potted plants, color preferences have changed over the past 10 years. "Red still predominates, but now consumers also want white and pink. And among geraniums, various shades and multiple-colored flowers on the plant have become popular," Johnson observes.

Sales of potted foliage plants are rising moderately after several years of downturn. Demand is improving because of consumer environmental concerns, better products, lower prices for some species, and attractive new varieties of foliage plants.

Also, Johnson notices a resurgence in consumer demand for the indoor benefits of plants, such as reduction of stress and maintenance of air purity. He expects that ficus, dracena, tillandsia, yucca, hydrangea, spathiphyllum, and dieffenbachia will likely sell well this year.

Industry Battling Imports

U.S. exports of greenhouse and nursery products are growing significantly, but imports are rising much faster. Also, import quantities of such products are making larger gains than are the values of imports, Johnson says.

The value of imported cut flowers, for example, rose only a modest 3 percent to total $326 million in 1990—but the total quantity rose 22 percent to 3.4 billion stems. This trend continued in 1991 as imported cut flowers reached a record 3.7 billion stems.

In fact, imports of cut flowers have penetrated the U.S. market more than any other greenhouse or nursery product, Johnson says. Foreign producers provide 61 percent of the cut flowers and greens in the U.S. market.

With the passage of the Andean Trade Preference Act in December 1991, four Andean countries gained duty-free access to the United States for their cut flowers. "This move will likely hold down prices of roses, chrysanthemums, carnations, gladioli, and other cut flowers and greens," Johnson anticipates.

The act was designed to promote alternatives to the manufacture and shipment of illegal drugs from Bolivia, Colombia, Ecuador, and Peru. Johnson says that Mexico and other Latin American countries have excellent potential to export cut flowers, foliage, and other horticultural products to the United States, Canada, and Europe.

He believes that specialty cut flowers offer the best investment for U.S. flower growers because Colombia, Mexico, and other Latin American countries are greatly increasing their production and exports of the major cut flowers. Specialty flowers include anything other than roses, carnations, chrysanthemums, and gladioli. They can be tropical items, such as orchids, or Dutch and summer flowers, such as gerbera, liatris, statice, and delphiniums.

In other words, some of the flowers traditionally grown in the United States are being displaced by imports. Between 1970 and 1991, U.S. domestic production surged 39 percent. But in the same period, imports of roses blossomed from nearly nothing to almost half of the U.S. market. "Thus, the most popular flower in America is competing head-to-head with imports," Johnson

says. In 1991, cut roses alone commanded $2.5 billion of the retail market.

As supplies proliferate, markets become highly competitive. Supplies of cut decorative greens such as ferns skyrocketed in 1991 as Latin American growers recovered from hurricane and other weather-related damage. Imports of major cut flowers also jumped, including roses, carnations, and chrysanthemums. Other flower imports, such as gypsophila and statice, rose too.

The U.S. cut flower market is estimated to have made $6.1 billion in retail sales in 1991 and is predicted to grow to $8 billion in 1995 and to $11 billion by the year 2000. The market has been growing by at least 5 percent a year over the past 20 years, but during 1990-91, the annual growth rate slowed to about 3 percent.

Johnson says that per capita sales of flowers and plants in the United States are still only about one-half those in Japan and many European countries. "This indicates that the U.S. market is definitely not near saturation and will likely grow more," Johnson says. "In fact, some industry analysts predict that the United States will have the highest per capita expenditure in the world for cut flowers by the year 2000."

He expects that U.S. growers who face stiff competition may branch out into other horticultural businesses. He points to carnation producers in Colorado who diversified into potted and bedding plants to avoid South American competition.

Also, any U.S. grower who can show economic hardship because of rising import competition resulting from the Andean Trade Preference Act can petition the U.S. Trade Representative to recommend that the Secretary of Agriculture review the case.

A Rosy Outlook

Sales of flowers and plants are directly linked to a country's gross domestic product (GDP), Johnson explains. "The United States has the world's largest GDP, and therefore represents the world's largest market for flowers and plants," he notes.

In 1991, the U.S. GDP fell slightly compared with 1990, but it is expected to grow by 3 to 4 percent in 1992. Johnson notes that during the past 2 years, the greenhouse and nursery sector has demonstrated recession resistance by continuing to expand, growing 7 percent each year.

Although 1990 grower prices were either equal to or slightly higher than 1989 prices for most floral, potted, and bedding plant crops, prices in 1991 were either weaker or slow to move much higher because of the recession and higher quantities of imports.

Johnson notes that grower prices are generally expected to regain strength in 1992, although this depends on the economy and demand in the spring, when most crops are ready for market.

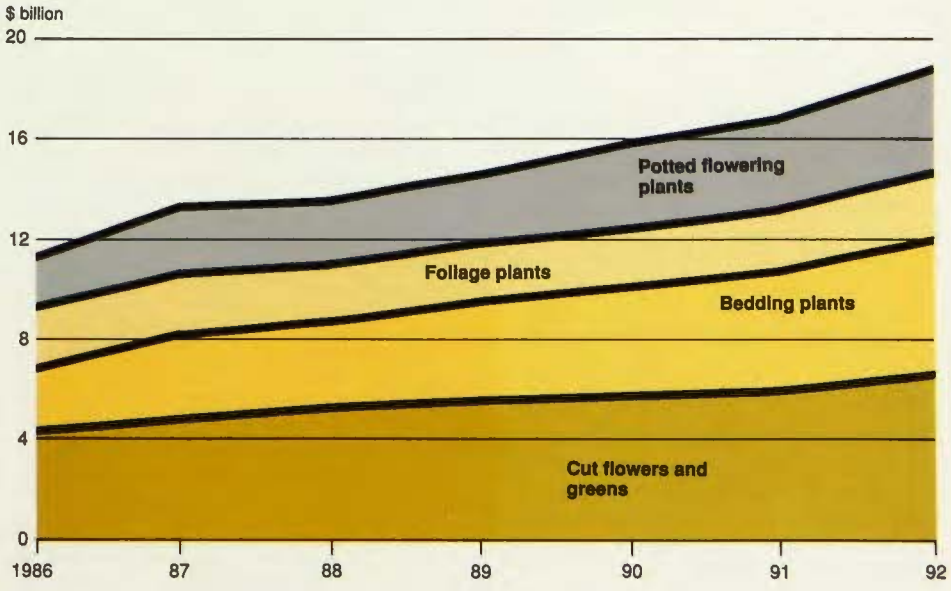
In 1992-93, Johnson says, growth should accelerate for floral and environmental products as the economy picks up. "If it continues at its current pace, we can still expect overall growth in grower cash receipts to average 6 to 8 percent higher in the next 2 years," he notes. "But if the economy picks up significantly in 1992-93, the outlook will be for double-digit growth in producer sales for most categories of greenhouse and nursery crops."

In 1992, sales of environmental plants should rise to about $25 billion (up from $23.3 billion expected for 1991) or to $97 per capita. But ornamental and other floricultural plants may command more than $18 billion (up from $17 billion expected for 1991), or $71 per capita, as consumer spending picks up after the recession.

Many of these products will be sold through mass merchandising—a great expansion of the array of floral and nursery products available through a wide variety of retail outlets. ■

Based primarily on information provided by economist Doyle Johnson, Commodity Economics Division, Economic Research Service.

Consumer Spending for Floriculture Products Has Risen Steadily in Recent Years



1992 forecast.

Sheep Producers Diversifying Into Other Enterprises

Sheep and cattle ranchers may have battled over grazing rights in the Old West, but these days they're finding that it pays to be a lot more friendly to each other.

"Mixed grazing provides greater potential to increase livestock production in the Western States than sheep or beef cattle operations alone," says economist Hosein Shapouri of USDA's Economic Research Service.

Many producers have already discovered this fact. Consequently, 66 percent of sheep producers also raise cattle, according to a 1986 survey, the most recent sheep study done.

Moreover, 33 percent of sheep producers grow crops, and 19 percent raise livestock other than sheep or cattle.

"The combination of sheep and beef cattle is most prevalent in the Northern Plains and Texas where private pastures and rangeland allow the flexibility needed for grazing mixed livestock," says Shapouri. "Currently, the flexibility for combined operations is not available to most Federal rangeland users because land use policies usually limit mixed grazing."

Sixty-six percent of sheep producers also raise cattle, and 33 percent grow crops.

He notes that the land itself—be it private or public—can sometimes limit mixed enterprises. For example, sheep are better able to graze on hilly or rocky terrain than cattle.

But raising sheep comes with some problems as well.

Predators and Disease

Lamb and sheep losses to predators and disease are high, taking more than 10 percent of the sheep inventory in recent years.

"Sheep and lamb losses in 1990 were 1.3 million head, or 11.7 percent of the January 1, 1990 sheep and lamb inventory," says Shapouri. "For the 11 Western States studied in the sheep cost of production survey, lamb losses before and after docking (marking) accounted for 67 percent of total lamb and stock sheep losses." (Docking is a kind of branding of lambs, usually performed by cutting the tail).

He adds that disease and miscellaneous causes, including weather, were responsible for most lamb losses before docking, taking 65 percent of all lambs lost in 1986. Predators, mainly coyotes, accounted for the rest.

"Weather conditions, usually in the form of winter and spring snowstorms, are always potential problems for western sheep producers, causing 26 percent of all lamb losses before docking," says Shapouri. "Diseases, internal parasites, and other causes accounted for 39 percent of lamb losses before docking."

Predators were responsible for 60 percent of lamb losses after docking. Losses to predators are higher for lambs after docking because of grazing and less protection.

"Coyotes killed about 39 percent of all lambs lost after docking," Shapouri says. "According to sheep producers surveyed, 6 percent of losses were from dogs and 15 percent were due to other predators."

"Big losses to predators and disease motivated sheep producers to diversify their agricultural effort to other livestock enterprises and crops," he adds.

Labor a Problem

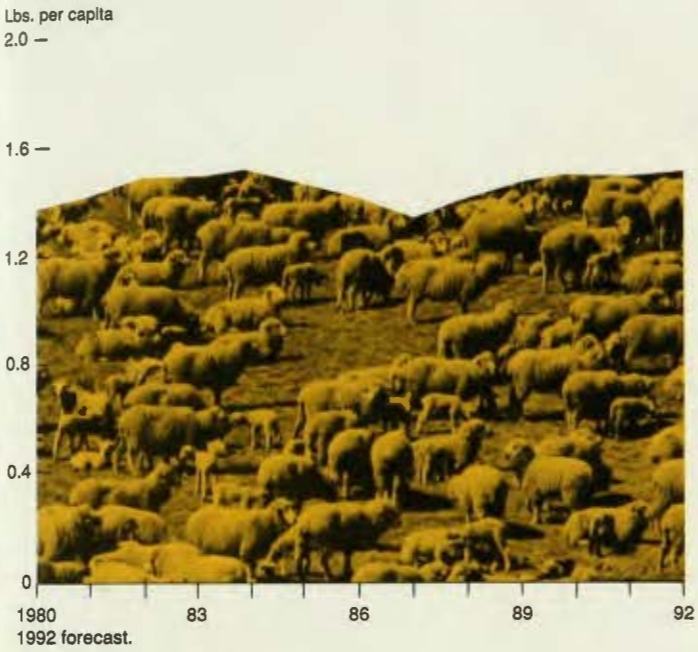
Another drawback to sheep production is its comparatively high labor requirements.

"Sheep production requires the use of more labor than other livestock," says Shapouri. In addition to operator and family labor, contract and hired labor is used extensively in sheep production in the Western States. Labor is used for feeding and taking care of ewes and newborns in the lambing season, and sheepherders are also hired to help on ranges and open pastures.

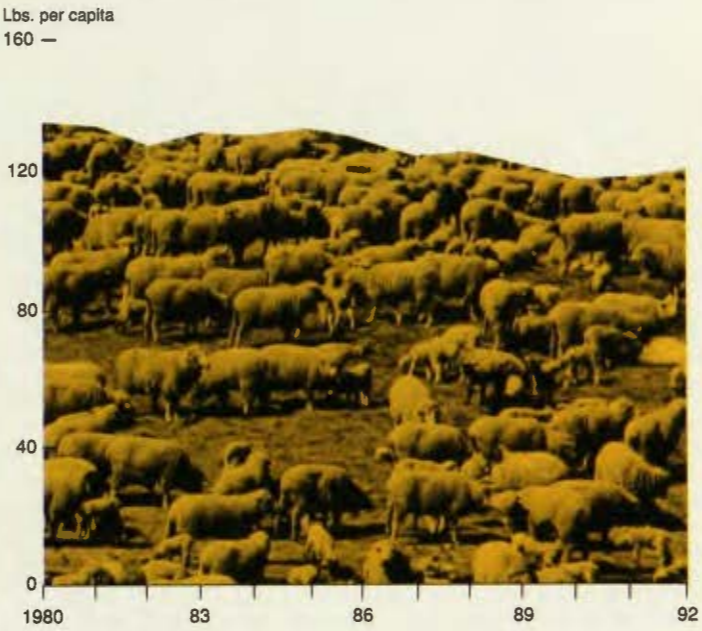
Fifty-eight percent of the labor needed for a sheep operation is provided by operators and their families, with the remainder coming from contract and hired labor. In the Western States, hired and contract labor use in 1986 ranged from 1.93 hours annu-

Sheep grazing on native pasture near Bridgeport, California

Lamb and Mutton Consumption Has Increased Slightly Over the Last 12 Years. . .



. . .While Consumption of All Other Red Meat Has Declined Markedly



ally per ewe in Texas to 1.38 hours per ewe in the Pacific area. Operator and family labor was highest in the Pacific region and lowest in Texas, and ranged from 3.44 to 1.57 hours per ewe. Sheep producers in the 11 Western States used 3.98 total hours of operator, family, contract, and paid labor per ewe. (The 11 Western States studied were Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Texas, Utah, and Wyoming.)

"The expenditure for labor in sheep production ranks second to feed costs," says Shapouri.

For these reasons—high losses and labor costs—the sheep industry requires greater returns than other livestock industries to encourage sheep producers to expand their production.

Although sheep enterprises had positive net cash returns (cash receipts less total cash expenses plus capital replacement) for the last 19 years studied (1972-90), the sheep and lamb inventory declined from 18.7 million in 1972 to 10.1 million in 1986, and then increased to 11.4 million in 1990.

"The past downward trend in the sheep industry was caused by internal industry and market factors," says Shapouri. A combination of factors, many interrelated, has discouraged sheep production. Continuing seasonal demand for lamb meat, low per capita consumption, low wool prices, the substitution of artificial fibers for wool in apparel, problems with predators, lack of suitable labor, and little improvement in slaughtering and marketing infrastructure are the basic reasons for the decline of the sheep industry. On the other hand, lamb meat imports from New Zealand and Australia have had little impact on the market for domestically produced lamb meat.

"The inventory of all sheep and lambs declined from 56.2 million head in 1942 to 11.2 million head in 1991," says Shapouri. "Sheep population peaked in 1942 and has decreased steadily, except for two plateaus in the 1950's and 1980's. Since 1980, the U.S. sheep population has fluctuated between 10 and 13 million head."

The average U.S. sheep producer had 69 breeding ewes in 1990. For the 11 Western States studied, the average was 141 breeding ewes per producer, and for all other States it was 31. Farms with fewer than 100 ewes accounted for 88 percent of all farms in 1991.

This large percentage of producers owns only about 23 percent of the total number of breeding ewes. Large producers, who accounted for only 2.5 percent of all farms with sheep enterprises, owned 58.9 percent of all sheep and breeding ewes in 1991.

Shapouri says large flocks are even more dominant in the 11 Western States. In those States, flocks with 500 or more head are maintained by 5.6 percent of producers and accounted for 74 percent of breeding ewes in 1991.

"Both the number of farms and sheep population declined from 1978 to 1987 for farms

with fewer than 100 ewes, falling by 4 percent in the Western States and 7 percent nationwide," says Shapouri. In contrast, the number of farms with more than 100 ewes increased both in the Western States and the Nation. The number of breeding ewes on those farms with more than 1,000 ewes also increased.

The average flock size for western producers declined from 194 ewes in 1978 to 162 in 1987. Of the western producers, 69 percent have fewer than 100 head of sheep and breeding ewes, 26 percent have 100 to 999 head, and 5 percent have 1,000 or more head.

"Commercial sheep operations are critical to the U.S. industry," notes Shapouri. "Flocks with 1,000 or more head were maintained by 2 percent of all producers and accounted for more than 50 percent of total sheep and lambs in all census years."

Going to Market

Sheep producers market four different commodities: feeder lambs, spring lambs for slaughter, cull sheep for slaughter, and wool. On the meat side, 75 percent of marketings are fed lambs. Slaughter lambs account for 15 percent of marketings, and cull ewes make up the remaining 10 percent.

U.S. lambs have a distinct seasonal pattern of production in the spring and fall. Average monthly lamb slaughter has been highest in March for the past 20 years. Lamb slaughter reaches its peak in March and then declines from April through June before peaking again in October. The slaughter pattern for mature sheep differs from that of slaughter lambs. Mature sheep are culled after the lambs are weaned in early summer or fall.

Per capita consumption of lamb and mutton peaked in 1945 at 6.5 pounds (retail weight). "Per capita lamb and mutton consumption have held fairly steady over the last decade, while per capita beef and pork consumption have sharply decreased," says Shapouri. "Red meat consumption has, however, been losing its market share to poultry, which accounts for most of the increases in total meat consumption."

He says that lamb and mutton are eaten by only a small percentage of U.S. consumers. Consumption of lamb is higher during holiday periods and associated with religious traditions and consumer habits. Since 1976, lamb and mutton consumption has varied. In 1991, the per capita consumption of lamb and mutton was 1.5 pounds, and USDA economists project that it will remain the same this year.

"The lack of a year-round consumer base, higher lamb prices relative to beef and pork, and especially to poultry, and the lack of new product developments are some of the reasons lamb is not expanding its market share," says Shapouri. "Gains for the lamb industry depend on increasing the consumer base. Even though lamb has been sold in the United States for many years, it is unfamiliar to many consumers. In a marketing context, lamb should be approached as a new or specialty product."

He goes on to say that lamb prices, like production, follow a fairly consistent seasonal pattern. During spring months, prices rise, hitting the highest point in May. Through summer and fall, prices decline, bottoming out near the end of the year.

"This pattern is due partly to seasonality in lamb production and consumption," says Shapouri. "The producer decision to take advantage of weather conditions and availability of pasture and feed supplies means a large number of lambs are marketed in summer and late fall, pushing prices lower during this period."

Mexico is the main export market for U.S. live sheep. More than 777,000 animals, valued at $26.6 million, were sold to that country in 1991. Overall, U.S. exports of sheep and lambs in 1991 topped 810,000 head, with a value of $24.5 million.

The Wool Story

Less than a third of sheep producers' revenues come from wool.

"Generally, a larger percentage of the U.S. sheep flock is raised for meat, but high-quality wool is also produced from wool breeds in the Eastern States," says Shapouri. "Wool production has declined faster than sheep numbers, due to a slight productivity drop."

He says that about 18 percent of revenue from raising sheep comes from the sale of wool—and 12 percent of that is from Government payments. The Government program guarantees a price level per pound which protects producers from price variations. As a result, changes in wool market prices have only a minor effect on the number of sheep and the level of wool production.

Shorn wool now accounts for almost all U.S. wool production. The pulled wool share of total production declined from 10 to 15 percent during the 1950's and 1960's to about 1 percent in 1989. (Pulled wool is separated from the sheep at slaughter, while shorn wool is clipped from live animals.)

"The drop reflects the growing demand for pelts with the wool intact," Shapouri says. "The garment manufacturing industry relies on the superior quality of U.S. sheepskins."

Even so, shorn wool production declined from 388 million pounds, greasy, in 1942, to about 90 million in 1990. (Greasy wool refers to raw, unwashed wool.)

With all the changes in the industry, sheep are no longer the prime income source for western operations. In 1986, farm businesses with sheep obtained only 27 percent of their gross agricultural income from the sheep enterprise. Only in the Northern Plains did lamb and wool income provide more than 40 percent of gross income, according to the 1986 survey.

"Losses to predators and diseases persuaded many sheep producers over the last two decades to shift their agricultural effort more to beef cattle," says Shapouri. "Based on the 1986 survey, cattle sales were the principal enterprise in every region except the Northern Plains, where sheep and cattle were equally important."

Comparing 1986 with 1980 shows that gross income from the sale of sheep in the Western States declined from 65 percent to 27 percent of gross agricultural income, while gross income from the sale of cattle increased from 24 to 58 percent of gross agricultural income. Gross income from the sale of crops and other livestock remained almost unchanged.

But for those who have stayed in the sheep business, albeit on a smaller scale or in combination with other agricultural interests, sheep production continues to be a profitable venture. Cash receipts were large enough to cover all cash expenses for sheep production during the past 19 years. Lamb and wool prices have kept pace with rising production costs, and total cash receipts in 1990, including Government payments for wool, were 153 percent higher than in 1972 ($62.27 per ewe in 1990 compared with $24.66 in 1972).

"Increases in lamb meat and wool consumption may encourage U.S. producers to expand sheep production," says Shapouri, "given the fact that the industry has experienced higher returns than cattle and hog production." ■

Based largely on information provided by economist Hosein Shapouri, Commodity Economics Division, Economic Research Service.

Wool Prices Have Fluctuated Widely Over the Last Two Decades

Aquaculture Laying Groundwork For Future Growth

Aquaculture is U.S. agriculture's latest success story, and its potential is just being tapped.

Over the past two decades, U.S. producers have taken to aquaculture production and have been quite successful, making it a major force in some parts of the domestic market. "In 1990, fresh and frozen finfish consumption was 6.6 pounds per capita, over 10 percent of which was U.S. farm-raised catfish," says economist David Harvey of USDA's Economic Research Service.

Per capita consumption of seafood peaked in 1987 at 16.2 pounds, then fell to 15.5 pounds in 1990. But between 1980 and 1990, per capita consumption surged by 24 percent.

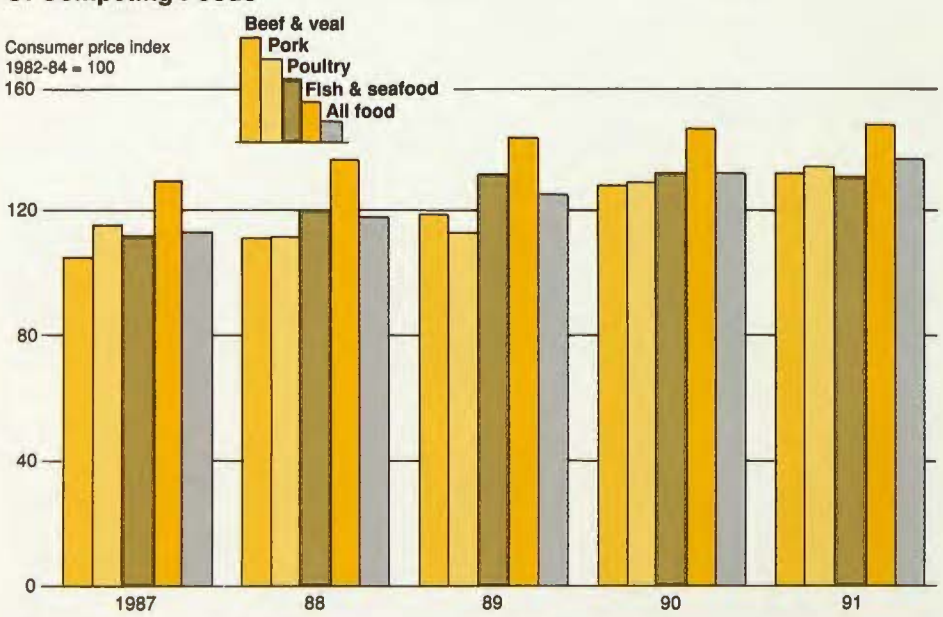
About 90 percent of the fish consumed is from wild-catch, also called fish landings (fish caught from the ocean or other natural sources). Edible fish landings rose from 4 billion pounds in 1985 to 7.3 billion pounds in 1990—up a whopping 82.5 percent. In 1990, total commercial landings reached a record 9.7 billion pounds.

Most catfish and trout in restaurants and stores were likely raised on domestic fish farms.

But the harvest of wild-catch is approaching its full potential, according to industry observers, so aquaculture producers will need to fill future demand.

Farm-raised finfish account for the other 10 percent of consumption. Harvey says that the catfish and trout found in restaurants and stores were likely raised on domestic fish farms. Just 10 years ago, domestic production accounted for only about 5 percent or less of seafood consumed.

Prices for Fish and Seafood Have Increased Faster Than Those Of Competing Foods



Source: *Aquaculture Situation and Outlook Report*, USDA, March 1992

Building a Market

"Aquaculture production grew at explosive rates in the 1980's—about 20 percent per year," Harvey says. "And it should continue to expand in the 1990's, although at a slower pace."

The groundwork for the future of domestic producers will be laid during the 1990's, Harvey explains. Producers will have to make decisions that will help them compete with wild-catch harvesters. "Since many wild-catch species cost less than a dollar per pound, aquaculture producers will not be able to compete directly with this source on a large scale for the foreseeable future," Harvey says.

To help producers compete more effectively, researchers are experimenting with the use of hormones to improve the productivity of finfish and shellfish. "Hormonal controls are being developed in three areas," Harvey says. "First, to get species to spawn in captivity that normally do not spawn while captive. Second, to get species to spawn more than once a year. And third, to use sex reversal so species could be converted to the faster growing sex."

Other options open to domestic producers are to raise high-value species, such as hybrid striped bass, sturgeon, and abalone. But Harvey cautions that markets for these items are fairly small.

In addition, producers can provide specialized products for niche markets. They can also produce species for which there is no substantial wild-catch or species for which the catch has been restricted to recreational purposes, such as redfish.

Good production techniques are another advantage producers can use as a marketing tool.

"Because aquacultural producers can maintain a controlled environment, consumers can be assured that the fish have a proper diet, that the quality of the water in which they live is high, and that products

This Tennessee catfish farm covers 50 acres

are fresh," Harvey observes. "The aquaculture industry can inform the public of the high safety standards that ensure their products are free from disease and contamination."

The industry could also develop brand names that consumers will associate with quality. This is already being done for some species.

One of the drawbacks to aquaculture production is the relatively high cost of its products compared with other meats, which depresses consumer consumption of fish in a slowing economy, according to Harvey. Many aquacultural products are relatively more expensive than competing protein products, such as poultry, although Harvey cautions that true price comparisons need to be on an edible weight basis. Retail seafood prices rose 25 percent between 1986 and 1990, compared with 21 percent for pork and 16 percent for poultry.

Market To Stay Strong

Many Americans have positive views of fish because of its nutritional value. "Most varieties are low in calories, fat, and cholesterol, especially when compared with other meats," Harvey explains.

In addition, some fish are known to contain omega-3 fatty acids, which have been found to reduce the risk of heart disease in some biomedical studies. Research is being done on special finishing diets that would boost the levels of these acids in farm-raised fish.

The increasing U.S. population will also help ensure strong demand for seafood. "Population growth alone will likely boost demand by 35 million pounds each year," says Harvey. "This could mean an additional 70 million pounds of farm sales yearly, since only about half the weight is edible."

"U.S. aquacultural producers keep up with the latest technology, and therefore the industry continues to change as more is learned about various species of fish," Harvey explains.

He notes that better feeds constitute one of the biggest advances. "In the industry's early days, most fish feed was geared toward the nutritional needs of catfish, trout, and salmon—but feeds are now becoming available for a wider variety of fish, thereby increasing productivity," Harvey says.

New feeding strategies are also being developed that will promote better growth or cut down on the amount of fat in the product. Harvey adds that experiments are under way to develop cheaper feeds that use lower cost ingredients or byproducts from other industries.

Efficient hatchery systems are another major innovation. While thousands of eggs may be laid by one fish, only a small percentage of these hatch in the wild, compared with about 75 percent or more on fish farms. "Ongoing research will likely give

Producer Prices for Farm-Raised Catfish Have Varied Considerably Over the Past Decade

Source: National Agricultural Statistics Service, USDA

producers the knowledge necessary to increase and refine production methods," Harvey says.

Three Grower Categories

The most prominent group in aquaculture are those who grow a specific popular species, such as catfish, trout, or salmon. "These producers are sophisticated and well established, with highly developed production systems, climbing output, and falling real prices," says Harvey.

The second group of producers raise fish that are not as popular with consumers but have good market potential. They tend to explore different growing and culturing methods and have not settled on the most productive techniques. Growers of hybrid striped bass, tilapia, and some shellfish fit into this category.

The third group are the experimenters. They try various species to determine their potential in commercial agriculture. Growers of such species as walleye, sturgeon, and halibut would fit into this category. This group has only minimal production, and additional research is needed on different aspects of the production cycle.

The oldest and most common method of raising fish is the use of the earthen pond, and this is the way most catfish are raised. Trout are traditionally raised in raceways—long concrete tanks. Lately some trout producers have used indoor tank systems, which are conducive to year-round production. Floating net pens placed in the ocean are commonly used for growing salmon.

Industry Has Room for Growth

Most domestically produced seafood is consumed here, but demand continues to exceed supply. "The United States has a $5.2 billion seafood import market that could be tapped by domestic producers," Harvey says.

Increasing exports offer another important market for American seafood. Japan is our largest seafood export market, accounting for 57 percent of the quantity of U.S. edible seafood exports in 1990, and 64 percent of the value.

"Even though the Japanese population is expected to show little growth, income levels are strong, and per capita consumption of seafood is high," Harvey says. These factors may favor targeting specialty products such as sturgeon, redfish, and striped bass to this market.

Europe, mainly the European Community, is another growth market for U.S. seafood, Harvey says. Since European aquaculture production is concentrated in salmon, trout, and mussels, this opens the door for other American-grown species. "With a larger population than the United States, a relatively high standard of living, and strong seafood consumption, Europe offers U.S. seafood producers bright prospects for export expansion," Harvey says.

Both Japan and some European nations have had relatively flat wild-catch growth in the last decade, and the United States could fill that void. In addition, some popular species (such as catfish and crawfish) are not produced widely in these countries, affording U.S. producers another potential market.

While the United States is looking into the seafood export market, other countries are doing the same thing.

Foreign producers are aggressively seeking outside markets, targeting high-income consumers in the United States, Japan, and a few other countries. Harvey splits these producers into two groups.

"The first group, which gears its production toward the export market, are producers rapidly adopting more advanced technologies and becoming more intensive in their use of inputs and capital, resulting in increased production for new species," he says. The second group gears its sales toward the local markets and are subsistence farmers.

"Because aquaculture is a relatively new industry, it has room to grow, both in productivity and efficiency," Harvey says. ■

Based primarily on information provided by economist David Harvey, Commodity Economics Division, Economic Research Service.

Leading Markets for U.S. Agricultural Exports
Fiscal 1991[1]

	1st	2nd	3rd	4th	5th	6th	7th	8th
				U.S. Exports, In $ Billion				
All U.S. ag products U.S. total: $37.6 billion	Japan 7.736	Canada 4.409	Mexico 2.884	South Korea 2.159	USSR 1.758	Taiwan 1.739	Netherlands[2] 1.561	Germany 1.135
Feed grains & products U.S. total: $6.8 billion	Japan 1.727	USSR 0.979	Mexico 0.622	Taiwan 0.603	Netherlands 0.330	Spain 0.261	South Korea 0.241	Saudi Arabia 0.225
Soybeans & products U.S. total: $4.7 billion	Japan 0.809	Netherlands 0.484	USSR 0.454	Taiwan 0.413	Mexico 0.399	Spain 0.244	South Korea 0.203	Canada 0.187
Live animals & meat[3] U.S. total: $3.3 billion	Japan 1.500	Mexico 0.519	Canada 0.515	South Korea 0.178	United Kingdom 0.120	France 0.099	Belgium-Luxembourg 0.052	Ireland 0.028
Wheat & products U.S. total: $3.1 billion	Japan 0.401	China 0.330	Egypt 0.283	South Korea 0.204	USSR 0.200	Algeria 0.160	Philippines 0.150	Taiwan 0.098
Cotton & linters U.S. total: $2.6 billion	Japan 0.536	South Korea 0.401	China 0.301	Indonesia 0.202	Italy 0.163	Thailand 0.112	Taiwan 0.112	Hong Kong 0.088
Vegetables & preparations U.S. total: $2.6 billion	Canada 1.014	Japan 0.362	Mexico 0.178	United Kingdom 0.097	Taiwan 0.084	Hong Kong 0.075	Germany 0.062	South Korea 0.044
				$ Million				
Fruits & preparations U.S. total: $2.4 billion	Canada 826	Japan 597	Hong Kong 125	United Kingdom 115	Taiwan 99	Germany 70	Netherlands 66	France 58
Tobacco, unmanufactured U.S. total: $1.5 billion	Japan 313	Germany 249	Netherlands 130	Spain 78	Dominican Rep. 65	Hong Kong 63	Turkey 62	Thailand 58
Hides & skins U.S. total: $1.5 billion	South Korea 648	Japan 319	Mexico 131	Taiwan 129	Canada 59	Italy 41	Hong Kong 23	France 15
Feeds & fodders U.S. total: $1.1 billion	Japan 363	Canada 198	Netherlands 142	Mexico 40	France 37	Ireland 27	United Kingdom 25	Spain 23
Poultry & products U.S. total: $1.0 billion	Japan 188	Canada 182	Hong Kong 124	Mexico 112	USSR 62	Singapore 30	Leeward-Windward Isl. 24	South Korea 20
Tree nuts U.S. total: $820 million	Germany 187	Japan 98	Canada 79	Netherlands 50	Spain 44	United Kingdom 42	France 42	Italy 31
Rice U.S. total: $749 million	Saudi Arabia 83	Brazil 62	Canada 51	Haiti 46	Turkey 43	South Africa 37	Switzerland 31	Liberia 29

[1]Oct. 1, 1990-Sept. 30, 1991. Data include exports under concessional programs such as P.L. 480. [2]The Netherlands is a major transshipment point for products destined for other countries. Because complete data on destinations are not available, the figures for the Netherlands have not been adjusted for transshipments. [3]Excludes poultry.

Source: *Foreign Agricultural Trade of the United States*, January/February 1992, Cecil W. Davison, Economic Research Service, USDA.

Shiitake Mushroom Production Gaining Ground

The shiitake mushroom (she-e-tá-kay) is the second most popular cultivated mushroom in the world, right behind the common white *agaricus* ("button") mushroom. Shiitake is the number-one edible mushroom in Asia.

"Increasingly, shiitake is being cultivated in the United States," reports economist Shannon Hamm of USDA's Economic Research Service (ERS). "And the outlook is promising. In crop year 1990/91, the United States grew 4 million pounds—up 18 percent from 1986/87."

Shiitake means "mushrooms of the shii tree," an evergreen closely related to the oak, which is one of the tree species on which shiitake grows. The mushroom's vegetative cells grow on freshly fallen trees that have not been decayed by other microorganisms.

Cultivation of shiitake began in Japan centuries ago, when wild shiitake was collected in the forest. It was found on fallen trees during the spring and autumn. Later, the Japanese and Taiwanese perfected commercial log and sawdust cultivation techniques.

Shiitake lends a full-bodied, aromatic, distinctly pleasant flavor to a dish.

The United States produces only 6 million pounds of specialty mushrooms (including shiitake) a year, compared with 749 million pounds for the white mushroom. The National Agricultural Statistics Service estimates that there are about 228 large commercial growers of all specialty mushrooms in this country, including shiitake producers. There are also numerous shiitake producers with small operations, according to Jerome C. Deden, executive director of the Forest Resource Center in Lanesboro, Minnesota. He bases this conclusion on the number of people who attend his educational program, many of whom have small operations.

The United States abounds in oaks and other hardwoods that are ideal for shiitake cultivation. Yet only a small fraction of U.S. consumers have ever eaten shiitake, and so far most of the product is sold in farmer's markets and restaurants.

Nevertheless, in 1990, the United States was the third largest importer of dried shiitake from Japan, according to economist Lois Caplan, also of ERS. Japanese exports to the United States totaled 235,895 pounds that year, valued at $3.4 million.

Cultivation Is Easy

Both the Japanese and Taiwanese log and sawdust methods of cultivation have been adapted to the United States. The preferred species of trees are often those referred to as low-grade "eastern" hardwoods, especially oak, chestnut, beech, and hornbeam. But species in other families may also be

Mushrooms command high prices in produce markets

suitable, such as maple, alder, birch, aspen, and poplar.

Although the cultivation method is not difficult, careful management is required to avoid contamination by competitive microorganisms and to ensure optimal production.

With the log method, logs are cut from live trees, allowed to age for a short period, and inoculated with an actively growing fungal culture. Cool or cold weather provides the best conditions for cultivation. At this time the sugar content of the sap (which benefits mushroom growth) is high, and the low temperatures retard the growth of competitive fungi. After inoculation, logs are arranged to favor mushroom growth. Sometimes soaking the logs in water can stimulate growth. After the fungus has colonized the logs, they are restacked to favor fruiting (growth of mushrooms on the log).

Sawdust methods use wood particle grain mixtures placed in plastic bags. After colonization, the bags are opened and placed into controlled environment chambers for fruiting.

If proper cultivation practices are followed, most of the mushrooms that grow on inoculated logs will be shiitake. Often a mycologist from a local college or university can help producers develop the skill needed to identify harmful varieties.

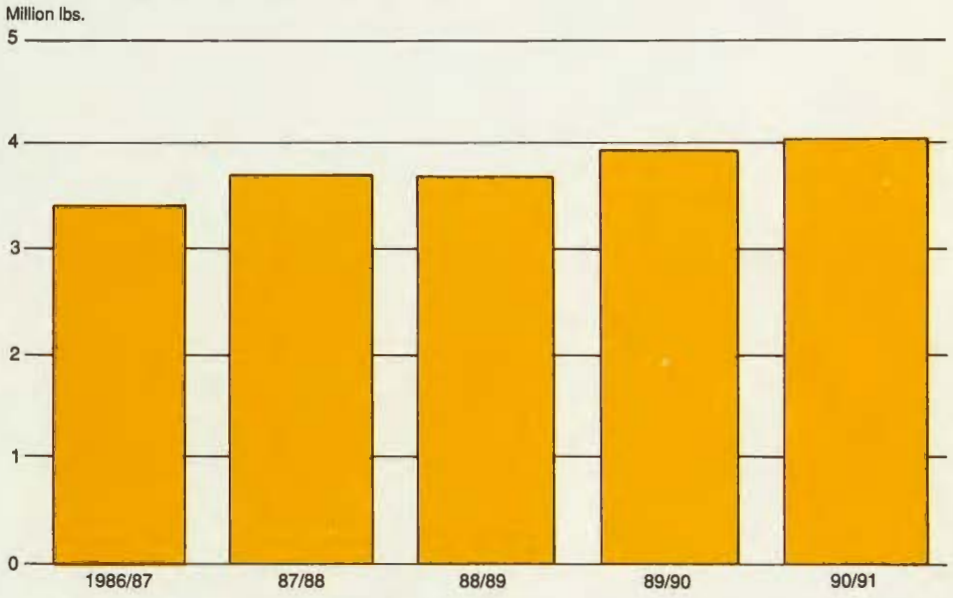
A Healthy Choice

Although shiitake is not likely to replace the common white mushroom as the favorite of U.S. consumers, it could become a second choice often used in different recipes. Shiitake is popular because it lends a full-bodied, aromatic, distinctly pleasant flavor to a dish, while maintaining its original color and chewy texture.

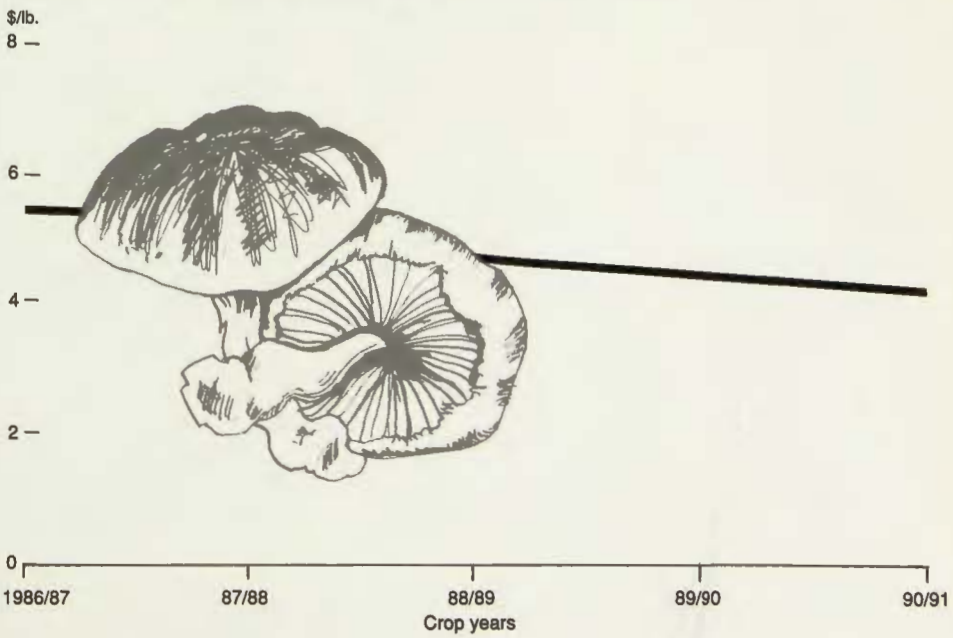
It resists both bruising and spoilage. Fresh shiitake has a 3-month refrigerated shelf life, compared with less than 1 week for the common white mushroom. It is easily dried and rehydrates well.

All mushrooms are a good source of protein, B-vitamins, and minerals. Shiitake outranks corn, turnips, potatoes, tomatoes, and carrots in nutritional value. It also contains a natural chemical compound called ergosterol which, when exposed to ultraviolet light or sunlight, is converted to vitamin D. In Japan, shiitake is occasionally treated with ultraviolet light and then marketed as a source of this vitamin. If treated with ultraviolet light, 1 gram can supply the adult minimum daily requirement of vitamin D.

Shiitake Production Has Risen Steadily. . .



. . .and Grower Prices Have Declined



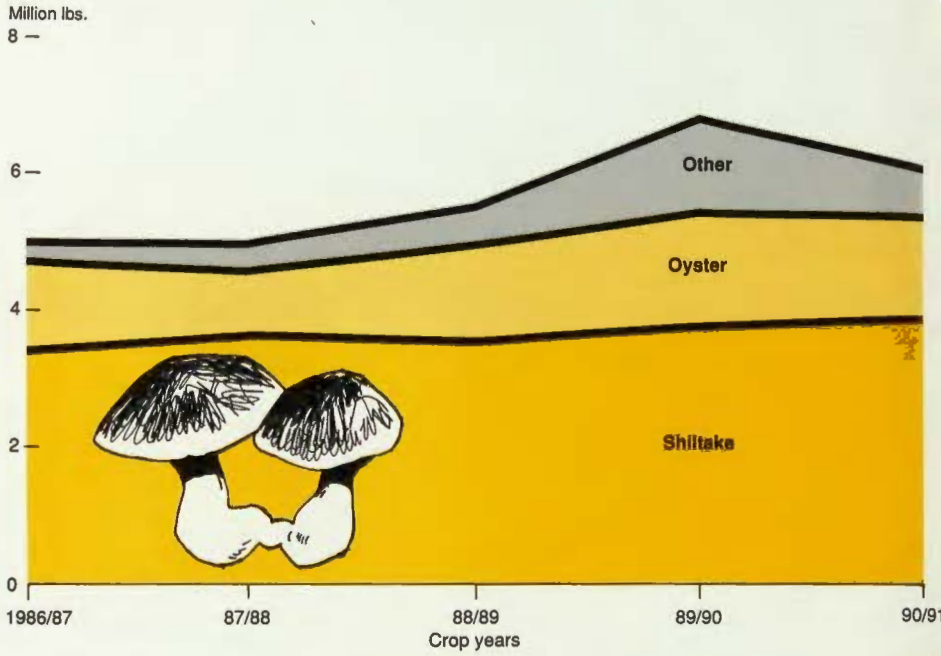
A Need for Better Marketing

As the U.S. population becomes better educated, more informed about food and health issues, and willing to experiment with different types of cuisine, Hamm expects demand for shiitake to rise. However, she also points out the need for better marketing.

The marketing order for fresh mushrooms authorized in the 1990 farm act pays for education of consumers and promotion of fresh mushrooms through funds collected from an assessment on the cash receipts of growers. However, funds are assessed only from those who produce 500,000 or more pounds of fresh mushrooms a year—far more than the output of most shiitake growers. Hamm therefore anticipates that most shiitake growers will be unaffected by the marketing order.

But Hamm does believe that providing more produce space in the retail markets for shiitake would boost market demand. In the 1970's, she notes, only about 90 different fresh fruits and vegetables competed for space in stores, compared with 300 or 400 today. (The same trend can be seen in fruit and vegetable consumption.) "Mushrooms contribute more to produce sales than would be expected from the space allocated, according to research done by a leading mushroom company," Hamm observes.

Shiitake Dominates Specialty Mushroom Sales

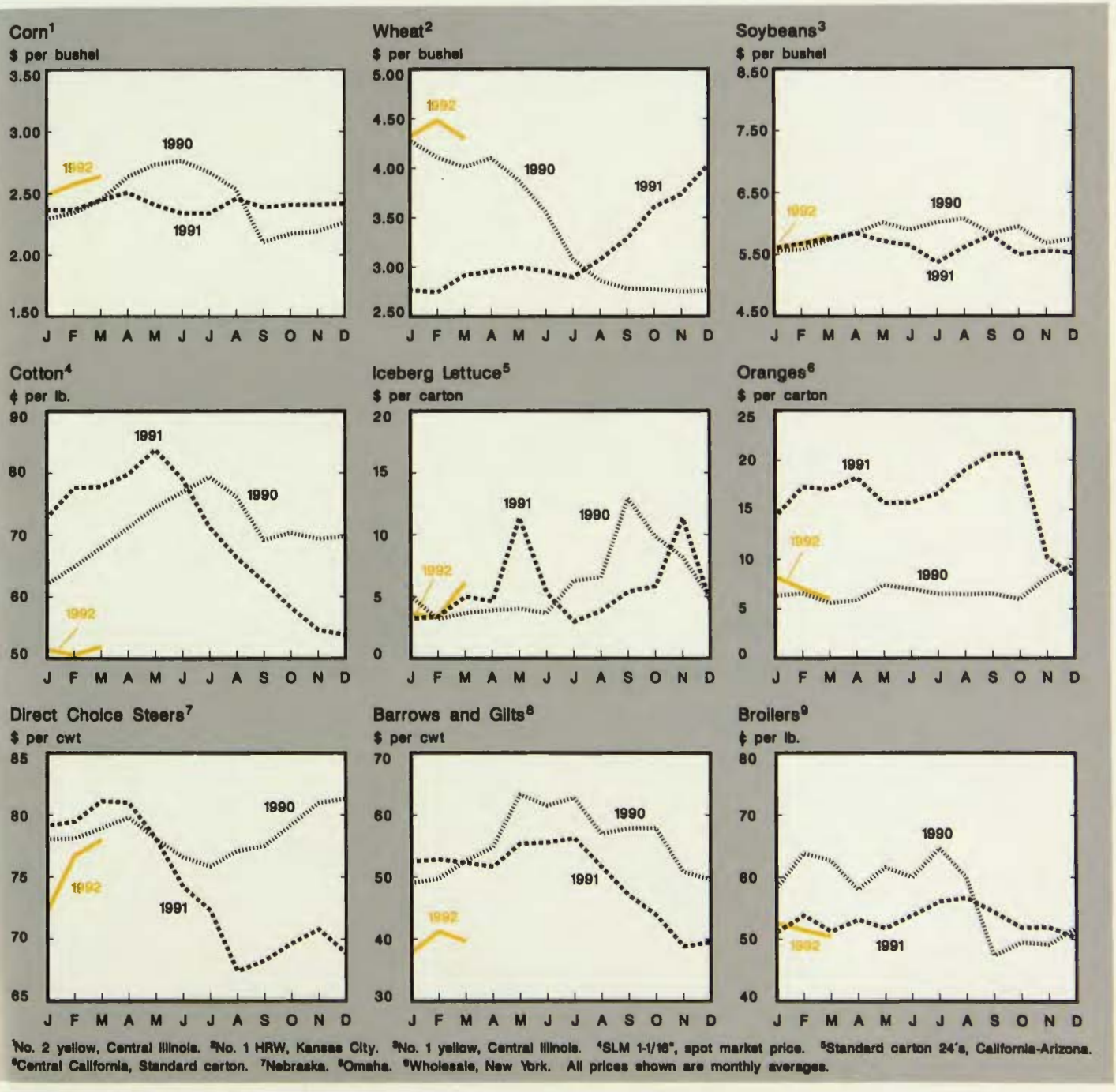


Jay Martin, a grower on the Eastern Shore of Maryland, reports rising demand for shiitake. Over the past 5 years that he has been in business, he has made a total of about $19,000, which has supplemented earnings from his greenhouse vegetable enterprise. ■

Based primarily on information provided by economist Shannon Hamm, Commodity Economics Division, Economic Research Service.

Monthly Price Monitor

USDA's March 1992 inflation-adjusted index of farm prices, from the National Agricultural Statistics Service's Agricultural Prices report, was 0.7% above February but was 3.4% below a year earlier. Wholesale market prices follow. Corn increased for the fourth straight month to $2.64 per bushel, while wheat dropped 18¢ per bushel to $4.31. Soybeans gained 13¢ to $5.81 per bushel. Cotton increased slightly to 52¢ per pound. Iceberg lettuce jumped sharply to $6.18 per carton. Oranges fell $1 per carton to $6.06, bringing the price in line with more normal (pre-1991) monthly averages. Direct choice steers rose to $78.03 per cwt. Barrows and gilts declined to $39.72 per cwt. Broilers slipped to 50.5¢ per pound.



[1]No. 2 yellow, Central Illinois. [2]No. 1 HRW, Kansas City. [3]No. 1 yellow, Central Illinois. [4]SLM 1-1/16", spot market price. [5]Standard carton 24's, California-Arizona. [6]Central California, Standard carton. [7]Nebraska. [8]Omaha. [9]Wholesale, New York. All prices shown are monthly averages.

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